Palau

Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for the Rehabilitation of Arterial Roads in the Metropolitan Area"

External Evaluator: Akemi Shimura

Ernst & Young Sustainability Co., Ltd.

0. Summary

The objective of the project was to secure smooth and safe traffic flows in the capital area of Palau through the improvement of the arterial roads in Koror and Airai state. The project is regarded as being relevant because it is consistent with Palau's development plan and Japan's ODA policy and the development need for it has been continuously high. Although the improvement of the average speed remained at a lower level than expected at the time of the ex-ante evaluation, the smoothness and safety of the traffic on the arterial roads was improved due to the rehabilitation of the road. The improvement of accessibility to social services by local residents and tourists and of the stability of transportation has been recognized. Therefore, the effectiveness of the project is fair. The outputs and the project cost were as planned, however the project period was slightly longer than the plan. Thus the efficiency of the project is regarded as fair. There are some concerns about the maintenance activities since some problems were observed with respect to the technical aspects, financial aspects, and the current condition of maintenance, although the manpower shortage can be solved.

In light of the above, this project is evaluated to be partially satisfactory.

1. Project Description

Project Location

The Arterial Road after its rehabilitation
(Section A: Downtown Koror)

1.1 Background

The arterial roads consisted of the causeways, which were improved in 2006 under a Japanese Grant Aid Program, and roads on Koror Island and other neighbouring islands, and the total length of road was about 17 km. The arterial road are the most important road in Palau because they connect

Koror Island where many social and business facilities are concentrated, Babeldaob Island with the only international airport in Palau and a new capital under construction, Malakal Island with an international port, etc. However, the condition of the roads was seriously deteriorated since no large-scale maintenance work had been carried out since 1993. Accompanying the increase in traffic at about 8% annually, partially due to the rapid increase in licensed drivers, the serious deterioration of the pavement had caused drivers to travel slowly. As a result, severe traffic congestion occurred frequently and traffic safety on the road was compromised. At the same time, the maintenance budget was not sufficient to fund large-scale road improvements or road construction since the funds had been used for routine road repair maintenance work. The deterioration of the pavement became more serious every year and traffic disturbance in downtown Koror worsened due to potholes[1] and large puddles after rainfall.

In addition, the sections of the road under this project became more important for development and government activities due to the relocation of the capital from Koror Island to Babeldaob Island.

1.2 Project Outline

The objective of this project is to secure safe and smooth transportation activity in Palau Metropolitan Area by improving parts of the arterial roads in Koror and Airai area.

Grant Limit / Actual Grant Amount	1,405 million yen / 1,405 million yen
Grant Agreement Date	May 2007
Implementing Agency	Ministry of Public Infrastructure, Industries and Commerce (MPIIC, formerly Ministry of Resources and Development)
Project Completion Date	February 2009
Main Contractor	Nishimatsu Construction
Main Consultant	CTI Engineering International
Basic Design	"Basic Design Study on the Project for the Improvement of Urban and Rural Roads in Koror and Airai States" CTI Engineering International, November 2006
Detailed Design	February - June 2007
Related Projects (if any)	[Grant Aid] The Project for Road Improvement (1987) The Project for Construction of a New Koror-Babeldaob Bridge (1998 - 2001) The Project of Improvement of Interisland Access

[1] Potholes are shallow holes in the surface of an asphalt pavement due to wear or weathering.

	Road (2004 - 2006)

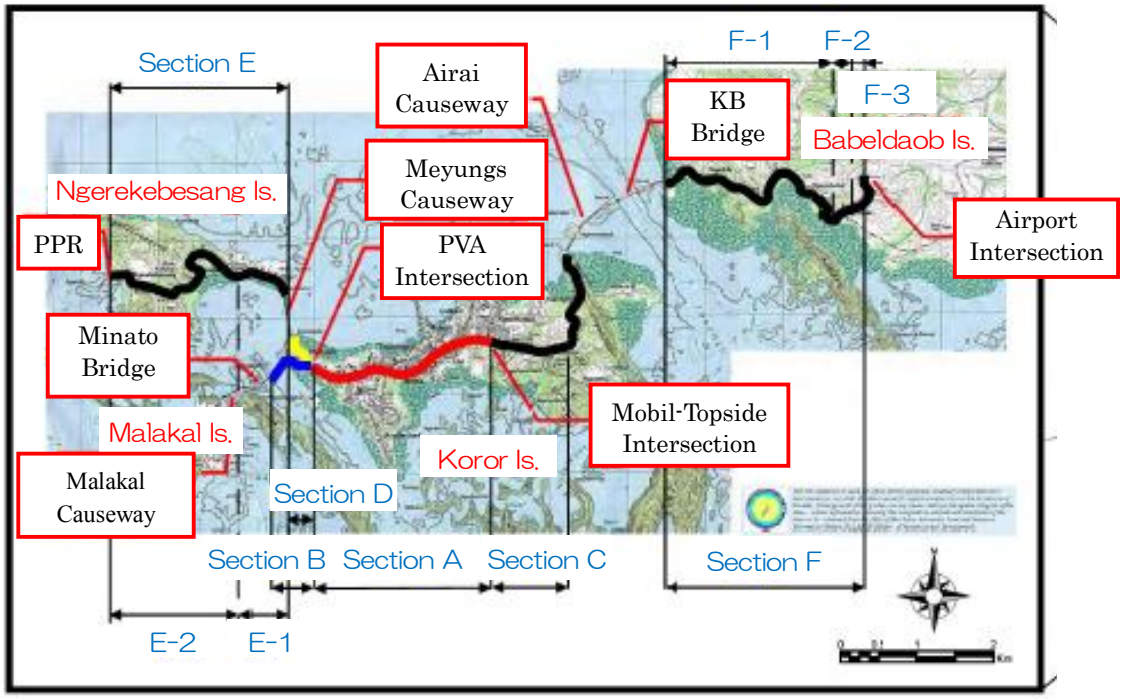

Figure 1 Project Location Map[2]

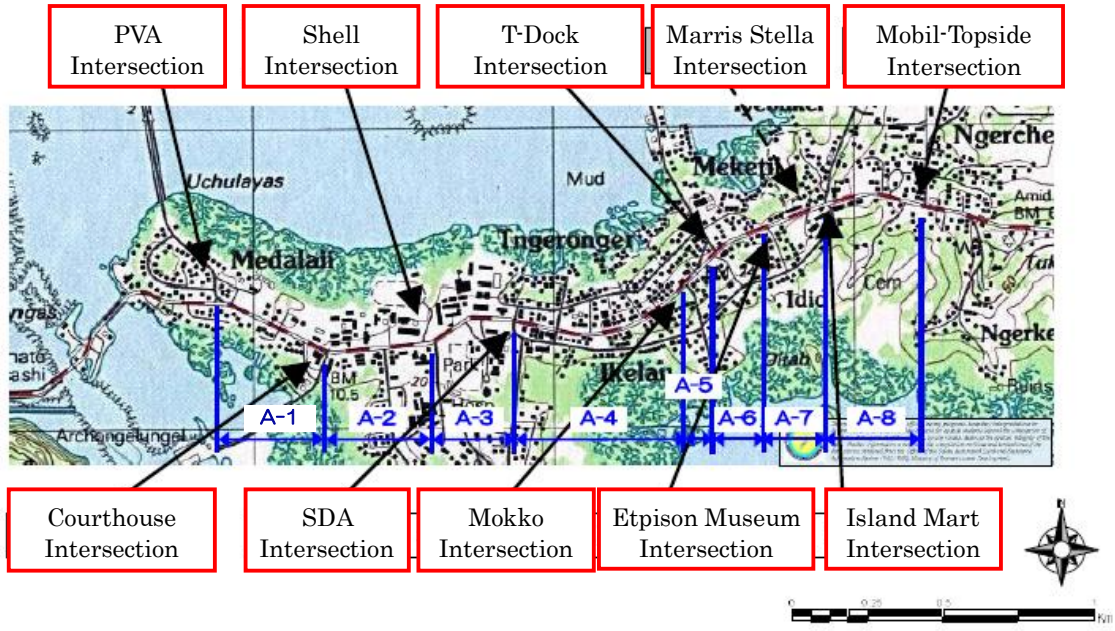

Figure 2 Location of the Major Intersections

[2] Section F-2 is excluded from the project site.

2. Outline of the Evaluation Study

2.1 External Evaluator

Akemi Shimura, Ernst & Young Sustainability Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: November 2011 – September 2012

Duration of the Field Study: February 26 – March 17, 2012

3. Results of the Evaluation (Overall Rating: C[3])

3.1 Relevance (Rating: ③[4])

3.1.1 Relevance with the Development Plan of Palau

In the Palau 2020 National Master Development Plan, effective before the time of the ex-ante evaluation of this project was implemented in 2006 until now, infrastructure development has been the highest priority issue to improve the Palauan quality of life. At the time of the ex-ante evaluation, the Public Sector Investment Program 2003-2007 (PSIP) defined tourism, agriculture, fishery, trade and light manufacturing industry as priority fields in economic development and the improvement of the arterial roads in the capital city was listed as one of the Tier "A" projects in the PSIP, namely the highest priority transportation project to achieve the development of industrial fields.

At the time of the ex-post evaluation, the Medium-Term Development Strategy 2009-2014 (MTDS) mentions five priorities, (i) Agriculture and Fishery, (ii) Tourism, (iii) Infrastructure, (iv) Foreign Involvement, and (v) Sustainable Government, and the MTDS puts a high priority on maintenance in (iii) the Infrastructure to prolong the lifetime of assets.

Therefore, this project has been consistent with the priority issues in Palau's development policy.

3.1.2 Relevance with the Development Needs of Palau

The relocation of the capital from Koror to Melekeok was carried out in order to remedy the overconcentration of urban functions in Koror at the time of the ex-ante evaluation. Many heavy vehicles including overloaded vehicles passed over the arterial roads for the construction of the new capital since it was the only road connecting Malakal Island with the largest landing port in the metropolitan area to Babeldaob Island and with Melekeok, the new capital. As a result, the traffic situation aggravated the deterioration and cracks in the pavement.

At the time of the ex-post evaluation after the completion of the capital relocation in 2006, the traffic volume of the arterial roads was undiminished since the basis of economic activities was still concentrated in Koror and tourism businesses, the key industry in Palau, were also based in Koror. There was no alternate road from Koror to the capital city and Palau International Airport on

[3] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[4] ③: High, ② Fair, ① Low

Babeldaob Island, Palau Port on Malakal Island, or the only national hospital on Ngerekebesang Island. The traffic in downtown Koror was also concentrated on the roads as maintenance of the side streets was only partially completed.

The need for the improvement and maintenance of the arterial roads has been recognized as stated above.

3.1.3 Relevance with Japan's ODA Policy

The Japan's basic ODA policy regarding Palau at the time of the ex-ante evaluation aimed at support for economic independence and the acceleration of sustainable development in the country through assistance in the following prioritized areas;

(a) Infrastructure
(b) Education
(c) Environment
(d) Healthcare
(e) Tourism
(f) Fishery

The project was included under "(a) Infrastructure" and is therefore consistence with Japan's ODA policy.

This project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy. Therefore its relevance is high.

3.2 Effectiveness[5] (Rating: ②)

3.2.1 Quantitative Effects (Operation and Effect Indicators) [6]

(1) Average Travel Speed during Peak Hours (Section A[7])

At the time of the ex-ante evaluation, the project was expected to improve the average travel speed on section A in peak hours from 15 km/hour to 25 km/hour. However, the agencies related to road transportation did not measure the average travel speed after the completion of the project. According to measurements by the evaluator during a field study[8], the average travel speed was only improved to 16.3 km/hour.

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[5] Sub-rating for Effectiveness is to be put with consideration of Impact

[6] At the time of the ex-ante evaluation, a "decrease in traffic accidents involving pedestrians" was mentioned as one more quantitative effect of the project. However, the related agencies including the police did not have the figures for the number of pedestrian-car accidents. In addition, the source data for the calculation at the ex-ante evaluation was likely to contain other types of accidents that happened outside section A. In light of this, "Improvement of Traffic Safety of Pedestrians by a Separated Sidewalk" is discussed as one of the qualitative effects in 3.2.2 instead of as a quantitative effect.

[7] PVA Intersection - Mobil Top-side Intersection (length: 2.7 km). The section runs through downtown Koror and is lined with commercial and public facilities such as department stores, privately owned shops, hotels, restaurants, and schools.

[8] The average speed was calculated based on the travel speed in the evening peak hour on March 1 and in the morning peak hour on March 6, 2012.

At the time of measurement, there was traffic congestion in the middle of section A even though the traffic was smooth, from 30 km/hour to 40 km/hour[9], in other parts of the section. Prioritization of the travelling direction and the installation of added lanes[10] were included in the intersection improvement plan for speeding up the traffic in section A, together with the maintenance of the pavement. The intersection improvement was planned under the assumption that the traffic volume would increase by 10.4%[11] at the maximum in five years. According to the traffic count conducted during the field study in the ex-post evaluation, the traffic volume at the PVA Intersection and Mobil Top-side Intersection decreased. However, the traffic at the SDA Intersection, in the middle of section A, increased by 18.8%, as shown in Table 1. The increase in traffic in the middle of section A is considered to be the cause of the traffic congestion and the average travel speed.

Table 1 Traffic at Three Intersections (16 Hours from 6 a.m. to 10 p.m.) (Unit: No. of vehicles)

	At the ex-ante evaluation (2006)*1	At the ex-post evaluation (2012)*2
PVA Intersection (beginning of Section A)	16,868	16,436
SDA Intersection (middle of Section A)	21,114	25,089
Mobil Top-side Intersection (end of Section A)	12,911	10,394

Source: *1 "Basic Design Study on the Project for the Improvement of Urban and Rural Roads in Koror and Airai States" CTI Engineering International, November 2006
*2 Actually counted on February 29, 2012

On the other hand, 62.8% of the respondents to a simplified beneficiary survey[12] answered "Significantly improved" or "Improved" as shown in Figure 3. According to interviews with the respondents who recognized an improvement in traffic congestion, the deteriorated pavement forced the users to drive slowly at many points and traffic congestion occurred more frequently before the project.

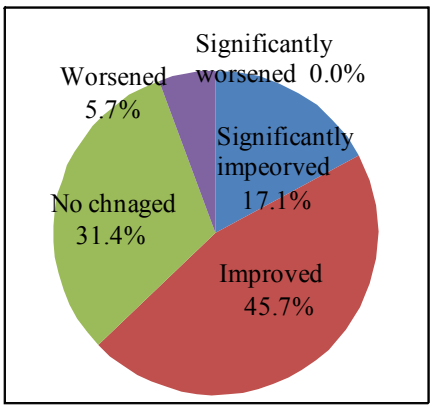

Figure 3 Traffic congestion in Section A compared with the condition before the project

Therefore, the users seem to have some recognition of the easing of congestion even though the average travel speed is slower than expected due to traffic congestion at

[9] The legal speed limit in Palau is 25 miles/hour (about 40 km/hour).
[10] An added lane in this project is a right/left-turn lane around an intersection. Added lanes were expected to avoid congestion or rear-end accidents caused by the blocking of through traffic by right/left-turning vehicles stopping at an intersection.
[11] An annual 1-2% growth in traffic over five years was expected at the time of the ex-ante evaluation. $(1.02)^5 = 1.104$ in total
[12] A simplified beneficiary survey was conducted as follows; period: March 2012, method: distribution of a questionnaire, sample size: 35 (25 local residents, 4 road-side shop managers and 6 tourist agents (including the Palau Visitors Authority).

the intersections in the middle of section A.

(2) Traffic Disturbance due to Road Submergence

At the time of the ex-ante evaluation, water accumulated on the surface of the road in the case of rainfall of 1 mm per day. The five-year average number of rainy days of 208 was regarded as the number of days the road was submerged and the target number of traffic disturbance after the project completion was set to zero. However, traffic disturbance due to road submergence and the correlation between the amount of rainfall and road submergence was not recorded even after the project. For this reason, the simplified beneficiary survey was utilized to assess the effects regarding the traffic disturbance due to submergence. 80% of the respondents were aware of a decrease in traffic disturbance, due to an overhaul of the drainage system (shown in Figure 4). Thus, the results of the beneficiary survey can be considered to indicate an effect equivalent to the original quantitative effect, even though the actual frequency of road submergence could not be obtained.

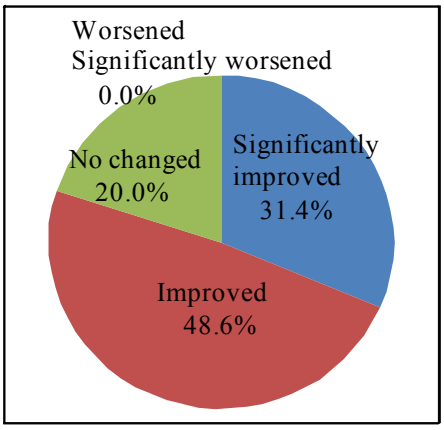

Figure 4 Traffic disturbance due to road submergence compared with the condition before the project

Therefore, the improvement of the pavement as a result of the project can be considered to have had the quantitative effects expected in the ex-ante evaluation to a certain extent.

3.2.2 Qualitative Effects

At the time of the ex-ante evaluation, "(1) To contribute to enhancement of transport reliability and efficiency by the improvement of the road," and "(2) To improve the safety of pedestrians by separating the sidewalk" were expected.

(1) Enhancement of Transport Reliability and Efficiency due to the Improvement of the Road

Interviews with the executing agency and road-side shop owners conducted to assess the qualitative effects of the project show that the project was effective in improving the punctual delivery of products and reducing the number of breakdowns of delivery vehicles. The installation of added lanes and the maintenance of the pavement are considered have been effective for the enhancement of transport reliability and efficiency by reducing the travel time and the frequency of breakdowns. According to the simplified beneficiary survey, all the respondents recognized that the condition of the asphalt pavement had improved (42.9% of them answered "significantly improved," the remaining 57.1% "improved"). Other positive answers regarding reliability or efficiency, such as the extension of the lifetime of vehicles and a reduction in vehicle maintenance

costs, were mentioned in the open question of the beneficiary survey. Thus it can be said that the expected effects were recognized.

(2) Improvement of Traffic Safety for Pedestrians due to a Separated Sidewalk

According to the simplified beneficiary survey, 94.3% of the respondents agreed to the effectiveness of the installation of the sidewalk to improve the safety of pedestrians walking along the road (Figure 5). Some respondents noticed local residents walking or jogging on the sidewalk for fitness exercise. The increase in the number of tourists strolling through downtown Koror was also pointed out in the survey.

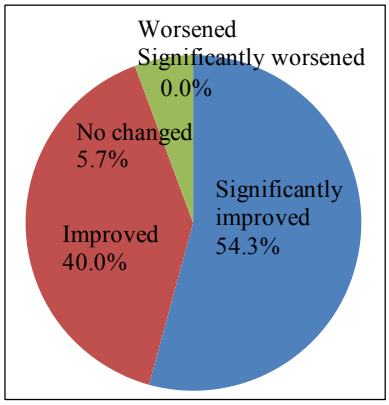

Figure 5 Improvement of traffic safety for pedestrians compared with the condition before the project

It is believed that the clear separation of the street and the sidewalk by road markings and the installation of lids covering U-shaped concrete ditches also contributed to the effects described above.

3.3 Impact

3.3.1 Intended Impacts

At the time of the ex-ante evaluation, the following indirect effects were expected after the completion of the project; "to increase the level of convenience of local residents and tourists using the arterial roads through the enhancement of transport reliability" and "to accomplish regional development, improvement of the capital functions, revitalization of the local economy, and improvement of accessibility to public service facilities for local residents and tourists through smooth road transportation."[13]

(1) Increase in the Level of Convenience for Local Residents and Tourists through the Enhancement of Transport Reliability

Research on the degree of enhancement of transport reliability was conducted by interviews with road users since it was impossible to obtain any data from the executing agency and other related agencies regarding the time required for travel between public facilities or the frequency of land transportation services before and after the project. Some school officials considered the smooth traffic after the project to be effective in reducing the number of tardy students since traffic congestion was not anticipated while most of the students in Palau come to school by car driven by

[13] "To cut air pollution by a reduction in traffic congestion and improvement of the travel speed" was also expected as one of the indirect effects of the project. However, the related agencies did not have any data regarding air pollution and the related agencies and local residents did not notice air pollution before or after the project. Thus, the effect on air pollution could not be recognized as an indirect effect of the project.

their parents. A tour operator stated that it had become easier to predict the arrival time to destinations than before the project. The project is regarded as having improved transport reliability to a certain degree.

(2) Improvement of Accessibility to Public Service Facilities

According to the simplified beneficiary survey, many road users agreed that the smoother land transportation had led to improvements in accessibility to public service facilities due to a reduction in access time (Figure 6). A hospital official remarked that the right-of-way in the center lane for emergency vehicles, which was enabled by the project, reduced the time taken to travel to the hospital.

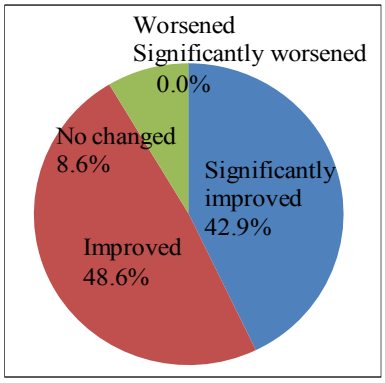

Figure 6 Improvement in accessibility to public service facilities compared with the condition before the project

(3) Improvement of the Capital Functions and Revitalization of the regional economy

An analysis of the GDP by industry was utilized to assess the change in capital functions and economic revitalization of the regional economy since the GDP by state is not provided in Palau.

Table 2 Real GDP by Industry

(Unit: Thousand US dollars)

	2006	2008	2010	2011
Real GDP	185,415	173,114	165,745	175,374
Wholesale and Retail Trade	34,500	33,344	29,035	30,049
Hotels and Restaurants	19,385	19,724	19,929	25,725
Real Estate, Renting and Business Activities	17,542	19,229	21,078	21,707
Construction	19,069	7,758	4,941	4,522

Source: Documents provided by the Office of Planning and Statistics

Shown in Table 2 above, the GDP from “construction” decreased rapidly, in contrast with urban-type industries such as “wholesale and retail trade,” which decreased slightly, or “hotels and restaurants” and “real estate, renting and business activities,” which increased in the same period. It can be said that the project indirectly promoted the mobility of people and goods in the capital area after the completion of the project since only urban-type industries are concentrated in this area.


Left: Renovated Pavement and Road Markings (Section F-1)

Right: Traffic Congestion during the Rush Hour (Section A, Shell Intersection[14])

3.3.2 Other Impacts

3.3.2.1 Impacts on the natural environment

The environmental standards for the United States Navy have been applied in Palau since the days under the trusteeship system. Implementation orders and administrative instructions regarding environmental protection and environmental assessment are well-maintained compared to other developing countries and the Environmental Quality Protection Board (EQPB) regulates construction activities to protect the environment. According to an investigation of related documents and interviews at the EQPB to check the impact of the project, the EQPB warned the contractor due to a violation of the Environmental Quality Protection Act regarding the dumping of soil and turbid water into the mangroves and the soil/asphalt cutting stockpile outside an approved area during the construction. However, the contractor immediately installed silt fence barriers after the warning from the EQPB. No impact on the mangroves was reported afterwards.

No impact on the natural environment was reported from the local residents, either.

3.3.2.2 Land Acquisition and Resettlement

At the time of the ex-ante evaluation, the project was planned without any resettlement of the local residents, but there was the possibility of land acquisition for a detour and the work areas for construction machinery beside the road in landslide areas. No land in landslide areas was actually acquired. However, land acquisition was conducted in part of section A to widen the road. The executing agency remarked that the land acquisition was completed smoothly since the land owners had appreciated the usefulness of the project, although the width of the sidewalk was decreased from 1.5 m to 1.3 m since more than one person had claimed ownership of a part of the area required for the project.

3.3.2.3 Unintended Positive/Negative Impact

According to the simplified beneficiary survey, some local residents were concerned about an increase in traffic accidents caused by speeding vehicles as a negative impact of the improvement of the asphalt

[14] The picture was taken from the Shell Intersection, looking towards the Courthouse Intersection.

pavement. The police department despatches policemen to the vicinity of schools and major intersections during the rush hour to control the traffic and give warnings to speeding drivers because of concern about speeding. Police ask for the cooperation of local residents to promptly make a report when they see speeding vehicles. The executing agency is planning to install additional traffic signs. Currently these measures seem to be effective as there are no indications that a serious increase in speeding-related accidents will become a social issue. The executing agency concerns about the possibility of collisions caused by two vehicles entering the center lane from opposite traffic simultaneously.

It can be said that the project has improved traffic flows at a certain level and convenience for the local residents and tourists due to the maintenance of the road pavement and the installation of drainage systems as mentioned above. The project can be considered effective in promoting economic activities in the capital area by improving stability in the distribution of goods and an increase in mobility for tourists. It is considered that the road markings and street lights installed under the project have contributed to traffic safety.

Accordingly, this project has somewhat achieved its objectives, therefore its effectiveness is fair.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The outputs of the project were basically implemented as planned. The general outline and changes in the outputs are shown in Table 3.

Table 3 Project Outputs and Changes

Section	Contents of the Work	Changes from the Basic Design	Length (m)
(1) Minato Bridge – Airport Intersection			9,205
A	Pavement, Auxiliary Lane, Sidewalk and Drainage, Intersection, Road Markings, Street Lighting, Guardrails	- Partial change in the width of the sidewalk (1.5 m→1.3 m) - Structure of the drainage - Height and location of the street lights	2,700
B	Pavement, Sidewalk and Drainage, Road Markings, Guardrails	As planned	530
C	Pavement, Road Markings, Traffic Safety Measures, Landslide Measures	As planned	2,377
F1	Pavement, Drainage, Road Markings, Traffic Safety Measures, Landslide Measures	- Cross-sectional structure of the landslide measures - Structure of the box culverts	3,122
F3	Pavement, Road Markings	- Pavement method - Type of center line	476
(2) PVA Intersection – PPR			3,326
D	Pavement, Road Markings	As planned	341
E1	Pavement, Drainage, Road Markings	As planned	1,150
E2	Pavement, Road Markings, Traffic Safety Measures, Landslide Measures	- Partial change in the cross-sectional structure of the landslide measures - pavement method	1,835
Total			12,531

Source: Documents provided by JICA

All the changes were regarded as reasonable for the smooth implementation of the project or as adjustments to the present state according to documents provided by JICA. No effects or impacts caused by the changes were recognized in the ex-post evaluation. Therefore, the changes are regarded as appropriate.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The grant limit on the Japanese side was a total of 1,405 million yen, and the actual total project cost to the Japanese side was 1,405 million yen, as planned.[15]

3.4.2.2 Project Period

While the planned project period at the time of the ex-ante evaluation was 24 months, the actual project period was 25 months, which was slightly longer than planned. The extension of the planned period is considered to be due to the delay in the construction work for 3 months caused by a delay in the procurement and delivery from Japan of the construction machinery necessary for the project. The consultant and the constructor increased the number of Japanese engineers and completed the project within the contract period. However, the actual project period exceeded the planned period.

Although the project cost was within the plan, the project period was slightly exceeded. Therefore the efficiency of the project is fair.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance of the arterial roads after the project is under the responsibility of the MPIIC's Department of Public Works (PW)[16]. Currently, the Road and Ground Maintenance Branch, which is in charge of road maintenance, has 43 staff (one engineer and 42 laborers). The branch divides the labourers into three teams and maintains the national roads across Palau. The respective teams do not stay in particular areas, but go around the roads day by day and the branch covers all roads except state roads. The number of staff is not sufficient since the total length of the roads under maintenance increased in 2007 with the opening of the Compact Road (85 km) going

[15] The actual cost to the Palauan side was not available because the cost was not recorded nor managed separately from other routine maintenance costs. However, there was no change in the project schedule or project outputs caused by delays in undertakings of the Palauan side. Therefore, the planned costs are considered to have been expended by the Palauan side at the appropriate time.

[16] The executing agency on the Palauan side changed from the Ministry of Resources and Development to the Ministry of Public Infrastructure, Industries and Commerce due to organizational restructuring. The personnel of the Department of Public Works were not relocated at the time of the organizational restructuring.

around Palau's largest island, Babeldaob Island. The director of PW has already requested a budget for recruiting 15-20 additional staff, including supplementation due a reduction resulting from the retirement of staff.

3.5.2 Technical Aspects of Operation and Maintenance

According to the director of PW, the Road and Ground Maintenance Branch can handle all types of maintenance work within the branch's responsibility due to the branch's technical capability. During site visits, no defects in maintenance that might cause traffic disruptions were found. However, some asperity and abrasion was recognized on the maintained pavement, which seemed to be the result of shoddy workmanship. It is deemed desirable to improve the technical capability to ensure a higher quality of maintenance work. Continuous training seem to be required in terms of quality improvements in the work although almost the only training sessions currently conducted are for new recruits. The maintenance equipment is not sufficient since many of the machines are in disrepair and the branch has to organize the allocation of the equipment.

3.5.3 Financial Aspects of Operation and Maintenance

The MPIIC budget for road maintenance work is combined with that for other roads throughout Palau and there is no separately established budget for the arterial roads under this project.

Table 4 Allocated Budget and Actual Expenditures for Maintenance

(Unit: US dollars)

	FY2009[17]	FY2010	FY2011	FY2012
Allocated Budget	694,281	740,000	750,000*1	750,000*1
Actual Expenditures	641,028	842,933	292,424*2	368,338*3

Source: Questionnaire response

*1 Requested budget because the national budget was not approved.

*2 The spending of the maintenance expenditures was constrained due to the uncertainty concerning the passage of the FY2011 budget.

*3 Actual expenditures up to February 2012.

Due to the delay in the deliberations on Palau's national budget for FY2011 and FY2012, the same amount of budget as FY2010 was applied temporarily. Against this background, the execution of the maintenance budget has stagnated. According to the bill for the FY 2011 national budget (originally applied from October 2011 to September 2012) was finally passed through the Palau National Congress during the field study on March 7, the budget for maintenance costs was increased by 1.0% from the FY2010 budget.

The budget amount is growing compared with the FY2006 budget amount, which was 300,000

[17] Governmental fiscal year in Palau starts October and ends September.

US dollars. However, PW does not expect that the budget will be enough to cover all the expenditures for spare parts for the machinery and materials for the maintenance of the pavement even though the budget will be executed. Thus, the financial resources for sufficient maintenance activities are assumed to be insufficient. Currently, PW does not require the maintenance budget to be based on an analysis of the budget and the actual expenditures, or estimations from past actual expenditures since PW cannot collect the necessary data, such as the total length of roads that PW is responsible for. It seems to be necessary for PW to request a maintenance budget in accordance with a rational budget plan based on past maintenance activities.

As another financial concern regarding the project, the electricity cost borne by the executing agency has increased by the street lights installed under the project. The executing agency makes an effort to reduce the financial impact by planning the replacement of the lights to LED (light-emitting diode) lights.

3.5.4 Current Status of Operation and Maintenance

The arterial roads under the project are the main roads running from Palau International Airport to the center of Koror state where 70% of the population of Palau reside and business facilities and public service facilities such as schools and a post office are concentrated along the roads. The arterial roads are widely used by local residents and tourists. Therefore the popularity of the facility under the project is considered to be high.

Trimming of the roadside grass and the trees and cleaning of the ditches seemed to be conducted regularly and no obstacles to road traffic were found during the site visit. However, the road markings and lines have worn off at some intersections, the entrances from parking spaces and sharp turns. Maintenance activities involving the use of materials seem to be delayed. Ruts[18] that are likely caused by overloaded vehicles were occasionally found in section F-1, where the drivers meet continuous sharp turns. PW recognizes the condition of the following facilities as particular problems;

(1) Deterioration in the pavement （cracks, ruts, reveling[19]）

The pavements in some sections under the project have deteriorated compared to other sections.

(2) Disappearance of road markings

The road markings are fading in some sections.

(3) Insufficiency of the drainage facilities

At some drainage facilities, the water is not discharged from the ditch and flows back onto the pavement.

There is concern that the deterioration will worsen in future years although none of the above conditions are likely to immediately cause a serious accident. However, investigation of the current status or major improvements is not currently planned by the executing agency.

[18] Ruts in this report are wheel tracks running longitudinally on asphalt pavements.
[19] Reveling is a condition of pavements with a peeled surface that pieces of the aggregate breaks away from.

Even at the time of the ex-ante evaluation, the distress to the pavement from overloaded vehicles was a concern. The maximum load capacity had been defined as 20 tons by the Trust Territory Government. Up to now, no laws or regulations to clamp down on overloaded vehicles have been established nor has any equipment to control overloaded vehicles been installed. Heavy vehicles, which seemed to be overloaded, were noticed in the early morning and at night during the traffic count. The related parties in MPIIC are concerned about the need for countermeasures and have recommended to congress the enactment of restrictive measures. However, this enactment has not been succeeded.

Locations where maintenance is required are identified by labourers or road users. No methods for the inspection of the condition of the roads, for the prioritization of maintenance locations, or for planning or maintenance including manpower planning have been established.

As described above, some problems have been observed in terms of the technical, financial, and current situation of operation and maintenance, therefore the sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of the project was to secure smooth and safe traffic flows in the capital area of Palau through the improvement of the arterial roads in Koror and Airai state. The project is regarded as being relevant because it is consistent with Palau's development plan and Japan's ODA policy and the development need for it has been continuously high. Although the improvement of the average speed remained at a lower level than expected at the time of the ex-ante evaluation, the smoothness and safety of the traffic on the arterial roads was improved due to the rehabilitation of the road. The improvement of accessibility to social services by local residents and tourists and of the stability of transportation has been recognized. Therefore, the effectiveness of the project is fair. The outputs and the project cost were as planned, however the project period was slightly longer than the plan. Thus the efficiency of the project is regarded as fair. There are some concerns about the maintenance activities since some problems were observed with respect to the technical aspects, financial aspects, and the current condition of maintenance, although the manpower shortage can be solved.

In light of the above, this project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Maintenance activities in Palau frequently do not go according to plan due to the rainfall. In addition, the total length of the road for maintenance has increased drastically with the opening of the Compact Road. However, data regarding the actual schedule and expenditures for maintenance has not been gathered. The estimation of the budget, scheduling and manpower planning for maintenance have been drawn up without making a comparison between the plan

and the actual situation or the consideration of changes in the circumstances as above. No method for inspections concerning the condition of the roads, including how to point out locations where maintenances is required, has been established. PW is required to (i) gather the necessary data for analysis of the variance between the plan and the actual activities, and (ii) request an effective budget and increase the efficiency of the maintenance activities with the prioritization of activities based on the condition of the roads.

(2) Appropriate measures are required to prevent the deterioration or malfunctioning of some facilities that were pointed out by the executing agency after objective investigations on the causes of the facts including the adequacy of maintenance activities.

(3) After the completion of the project, the traffic situation such as the travel speed has changed due to improvements in the smoothness of traffic flows. The executing agency is required to assess the current situation of traffic accidents and overloaded vehicles and take any necessary safety measures in cooperation with the police and other related agencies, including legislation to clamp down on overloaded or speeding vehicles and the installation of speed cameras and weight scales.

4.3 Lessons Learned

It is very important to establish a process to gather actual data and analyze it in comparison with the plans to ensure continuous and self-directive maintenance activities. In similar projects, it is necessary to confirm whether each executing agency has a systematic process in place for gathering and analyzing maintenance data. If this process is not sufficient, it is deemed desirable to implement seminars and/or on-the-job training for the establishment and maintenance of the process of planning and analysis.